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研究论文

聚偏氟乙烯电极化的动力学相变和铁电性

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摘要:

对聚偏氟乙烯进行高温电极化处理以改善半晶聚合物的铁电性,研究了其铁电极化值随着极化电场的连续非线性变化,

实现了结晶相中非铁电相向铁电相的转变.用动力学平衡方法模拟了聚偏氟乙烯样品的电场极化相变过程,结果表明:

聚偏氟乙烯中结晶区域的有效极化电场约为50 MV/m,与铁电聚合物的矫顽电场吻合;非晶无定型区域的等效电场与实验的相变开启电场接近,并得到了理论与实验符合较好的结果,从而证明动力学平衡方法模拟聚偏氟乙烯铁电相变的可行性.

关键词: 有机高分子材料 聚偏氟乙烯 电极化 动力学相变,铁电性

Dynamical phase transition and ferroelectric properties of poly(vinylidene fluoride) in electric poling

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Abstract:

The phase transition of crystalline in poly(vinylidene fluoride) from α anti-ferroelectric to β ferroelectric phase achieved by electric poling treatment with a high temperature has been investigated. It was found that the ferroelectricity of polymer was improved and the polarization depended on increasing poling electric field was non-linear. The phase transition of PVDF in electric field was theoretical simulated based on dynamical equilibrium. The results show that the effective electric field affected on the crystalline is 50 MV/m, which accords with the coercive field of ferroelectric PVDF. At the same time, the effective electric field affected on the amorphous is close to starting electric field of the phase transition. It demonstrates that the method of dynamical equilibrium simulated phase transition of crystalline in PVDF is feasible.

Keywords: organic polymer materials Poly(vinylidene fluoride) electric poling dynamical equilibrium ferroelectricity

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